
ADOLESCENTS AND SCHOOL BAGS

A Collaborative partnership between Uni SA, and
Dept Education, Training & Employment,



Protocol Manual for NH&MRC Study 1999

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The protocols outlined have been tested for validity and reliability, and have been agreed by the team. They have been fixed and are unable to be revised in any way now that the study is under-way.

Taking Photographs

Canon SLR cameras and a negative scanner are used to produce a computer image, which can be digitised and then used to measure student posture. The equipment is expensive and is set at standardised focal lengths and exposures. These **MUST NOT** be altered. Standard protocols for lining up cameras and subjects are outlined in this manual.

Tasks

1. To recruit 50 students from each of five schools (10 students from each class)
2. To obtain signed consent from all eligible and agreeable students, and their parents
3. To collect weight and height of subjects
4. To ensure subjects are appropriately clothed
5. To place anatomical markers very accurately on subjects prior to taking photographs. The markers are to be placed at:
 - Lateral canthus of right eye
 - Tragus of right ear
 - Lateral part of shoulder (mid point between greater tuberosity of humerus and posterior of acromion process)
 - Lateral superior border of iliac crest
 - Right greater trochanter
 - Lateral epicondyle of femur
 - Lateral malleolus
 - Spinous process of C7
6. To ensure that the students are accurately identified by placing their ID number so that it appears in every photograph
7. To line subjects up accurately with the camera according to the protocols
8. To ensure that the camera is positioned appropriately on the tripod for each photograph
9. To ensure that subjects are standing appropriately for each photograph
10. To take 12 shots of subjects using the allocated Latin Square design
11. To scan negatives and digitise photographs as described in the manual
12. To develop an Excel spreadsheet of results

Accurate placement of markers

Subjects will be in bathers or tight sports gear for photographing anatomical landmarks.



Posture Protocol for Camera Setup

At subject end:

Mark a T on the ground with masking tape. The **top of the T** pointing at the camera. Check that the two pieces of masking tape are at right angles to each other using the **set square**. Subjects will be positioned so that their right side is closest to the camera. The outer border of the right foot will be lined up with the inner edge of the **stem of the T**, and the toes will be on the inner edge of the **top of the T**. The string, which measures 4 metres, will be attached under the masking tape so that it lines up with the inner edge of the **top of the T**. The tripod (with the set square and number board attached) is in a fully extended position and will be lined up using a plumb line, so that when looking directly down, the set square is above the inner edge of the **stem** of the masking tape T. A spirit level is used to check that the tripod is level. (**Use spirit level attached to the board, as the spirit level supplied with the tripod is unreliable**) The centre of the two feet of the tripod are positioned at a distance 5 centimetres away from the inner edge of the top of the T. Place a piece of masking tape 5 centimetres parallel from the vertical masking tape line to facilitate tripod positioning.

At the camera end:

Mark off the string at 3.10 metres with a piece of tape measuring 8.5 centimetres, **ensuring that the tape is at right angles to the string using a set square**. This piece of tape extends from the string to the right, when facing away from subject end. At the end of this piece of tape the mid point of the front foot of the tripod is positioned, all legs fully extended. Adjust the tripod top so the handle is facing right when facing away from subject end. Place camera on tripod facing subject end. Tilt handle up until it stops so that the camera is rotated 90° anti-clockwise. and check that it is level with a spirit level across the front of the lens **in a vertical alignment**. The adjustable arm on the tripod is to be fully retracted. Ensure that the camera is centered over the string using a plumb line.

Camera settings

- Cameras will be switched off after each session (L on the dial).
- Each day set dial at **P** position.
- **This is the camera's automatic set up; thus it will select the appropriate shutter speed and aperture.**
- Pop up flash.
- Attach shutter extension cable.
- Affix camera to tripod.
- When pushing shutter button do not push up, as it locks the shutter and you will take continuous pictures.
- Note that when loading film, it winds through to the end. When developed, the last shot taken is the first negative.
- Ensure subject looking straight ahead at all times
- Ensure markers are visible in viewfinder.
- First shot normal standing posture. As normal as possible
- Second shot standing as straight as possible

Before the shot is taken ensure that:

- ✓ **All dots / markers are visible**
- ✓ **Hair is tucked out of the way and the C7 marker is clearly visible**
- ✓ **All markers are still attached**
- ✓ **Feet are flat on the floor, toes are not raised**
- ✓ **Students are looking straight ahead, head is not tilted**
- ✓ **Arms are in the correct position**



Experimental condition allocated via Latin Square design

The same Latin Square pattern is used for each year level (See Table 1), although separate Latin square records are kept for each year level (see enclosed book). As subjects in a particular year level enter the study, they are sequentially allocated to the next Latin Square pattern for their year.

Weigh subjects on the Mettler Electronic Scales, and measure their height using the height rule fixed to the wall. Calculate from their weight 3%, 5% and 10% body weight and organise the packets of paper (weights) into these loads. Load the first weight (as dictated by the Latin Square pattern) into the backpack.

Position the subject without a backpack (unloaded) as described later in this manual. Photograph within 5 seconds of assuming this position.

Commence the Latin Square allocation. Position the appropriately loaded backpack with the green dot on its front level with the subjects' required anatomical position (T7, T12 or L3). Photograph within 5 seconds of assuming this position.

Continue until you have allocated four experimental conditions.

Position the subject (unloaded) for the second baseline short. Photograph within 5 seconds

Continue until all the experimental conditions have been allocated.

Photograph the subject again in the unloaded position (3rd baseline).

Table 1. *Generic Latin Square pattern*

| Pattern |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| T12-10% | L3-5% | T12-5% | L3-3% | T7-3% | T7-5% | L3-10% | T12-3% | T7-10% |
| L3-10% | T12-3% | T7-10% | T12-10% | L3-5% | T12-5% | L3-3% | T7-3% | T7-5% |
| L3-3% | T7-3% | T7-5% | L3-10% | T12-3% | T7-10% | T12-10% | L3-5% | T12-5% |
| L3-5% | T12-5% | T12-10% | T7-3% | T7-5% | L3-3% | T12-3% | T7-10% | L3-10% |
| T12-3% | T7-10% | L3-10% | L3-5% | T12-5% | T12-10% | T7-3% | T7-5% | L3-3% |
| T7-3% | T7-5% | L3-3% | T12-3% | T7-10% | L3-10% | L3-5% | T12-5% | T12-10% |
| T12-5% | T12-10% | L3-5% | T7-5% | L3-3% | T7-3% | T7-10% | L3-10% | T12-3% |
| T7-10% | L3-10% | T12-3% | T12-5% | T12-10% | L3-5% | T7-5% | L3-3% | T7-3% |
| T7-5% | L3-3% | T7-3% | T7-10% | L3-10% | T12-3% | T12-5% | T12-10% | L3-5% |



PROTOCOL FOR SCANNING PHOTOGRAPHS

The scanner is attached to a desktop computer, located in the offices of the Centre for Allied Health Research.

1. Scanner must be on when computer is first turned on
2. Put the film in the scanner
3. Run Nikon scan 2.1 from the start programs menu
4. Insert 1 negative strip into the front of the scanner, emulsion side up. The scanner will pick up the negative strip once it reaches the cogs, don't force the film in or out
5. Click thumbnail tab, this will take some time then Nikon scan will display thumbnails of the shots on the negative, usually 4
6. If the software reports "there is no film in the scanner" just click the thumbnail tab again. If the software reports "the scanner appears to be off"; turn the scanner off for a few seconds and then turn it back it on (this will eject the film so make a note of which thumbnail you were working on). Reinsert the negative strip and this should fix the problem, if it does not; exit out of Nikon scan 2.1 and start again.
7. There will be a blue box around the thumbnail that indicates which shot the scanner is looking at. With this box around the first thumbnail click on the 'settings' bar then select 'backpack'; repeat this for all 4 thumbnails.
8. Return the highlighter box to the first thumbnail
9. Press the green 'scan' button. This will pop up a window asking you where to save the scanned image and what to call it.
10. Check that the image will be saved onto 'Backpack 00 on Health 0' if it is not set to save here, click the arrow beside the 'Save in' box and scroll down until you find 'Backpack 00' and click on that. Find the folder for your school and save the image in there
11. Ensure the file will be saved as a JPEG, select JPEG from the middle drop down menu
12. Under the 'JPEG compression' drop down menu, select 'good balance' from the list
13. Click on the box marked 'Prefix:' then enter the CORRECT Id code for the subject whose photo is being scanned, if the shot is the subjects tall shot add a T to the end of the code.
14. Click save and the scanner will do its stuff, this should take about 2 minutes and the green 'scan' button will then relight. Select the next thumbnail and repeat from step 9 above.
15. When all thumbnails on the negative sheet have been scanned, click the eject button on Nikon scan 2.1 (the button in the top left hand corner), once the negative has been ejected place it in a negative sheet holder. Label the negative sheet holder with backpack 2000 and School and film number.
16. Insert the next negative strip and start again from step 4



PROTOCOL FOR DIGITISING PHOTOGRAPHS

The program used for digitising photographs is called ImageTool and is loaded on the Centre for Allied Health computers.

1. Start Image Tool from the start programs menu
2. Start Microsoft excel from the start programs menu
3. Open the excel work sheet on your floppy disk that you will be saving your data to
4. Switch to Image Tool and select 'Settings' from the toolbar and click on preferences. Select the 'points' tab and uncheck the pixel value box. Click on 'apply' then click on 'OK'
5. Click on the 'open file' button (furthest left on the toolbar), this will open a window asking where to look for the file. On the 'Look in:' drop down menu select 'Backpack00' then the folder for your school, then select the image you want
6. Scroll the image until the subject becomes visible, it is quicker to click on the scroll bar itself rather than use the arrows. Click on the 'points' button on the tool bar; this is the button in the middle of the toolbar with dots on it (next to the 123 button). This will cause the cursor to change to a pencil when placed over the image.
7. Using the very tip of the pencil cursor, click once in the centre of the white dot at the canthus of the eye
8. Move next to the tragus of the ear, C7, shoulder, iliac, trochanter, knee then ankle
9. Close the image and the background data sheet will become visible and should have numbers on it
10. 'Cut' the data sheet and 'paste' into the 'scrap' sheet of your excel file
11. The scrap sheet now has the mean and standard deviations and the pixel values for the subject. Ignore the mean and standard deviations, we are not interested in these values. The pixel values run vertically with the x value in the first column and the y value in the second
12. 'Cut' the values from the scrap sheet and paste them horizontally into the template. The normal shot is condition 1 and the tall shot is condition 2
13. Repeat this process from step 5 until all images have been digitised
14. Save your excel file onto a floppy disk and give the disk to the project officer so that they can copy it and return it to you



PROTOCOL FOR POSITIONING STUDENT

Outside of right foot lined up with inside tape, and outside of right toes lined up with top tape.

Place ID Number on board. Write in large numbers in black. For the second shot add a T.

Equipment: Cameras, film, 4 metre long string, plumb bob, spirit level, tripod for camera, number board, masking tape, dots for markers, silver ball as C7 marker, set square, hair clips, bulldog clips, texta, paper.

- “Demonstrate stance:-
 - **(Shoes off)** “Put your right foot here, like this with toes behind edge of tape. Put your left foot up to the tape”.
 - “Take your weight through both feet.”
 - “Stand comfortably in your normal standing position i.e. if you are waiting for a bus or at the canteen etc. and look straight ahead at the vertical line.”
 - “I need to bend your elbows so we can see the dots on your hip” Pt to move elbows with minimal shoulder movement keeping elbows touching body.
 - “Look straight ahead at the vertical line.”
 - “Hold arms still in this position.” Elbows are approx. 90 degrees and thumbs up sign.
 - **Ensure that posture is as “normal” as possible and all dots are visible.**

Shot Two

Taking the photographs (use a stool if necessary)

Position the student as above for Shot one, and take one photograph. On the recording sheet, write the student ID number, and the number of the first shot. Mark a ‘T’ on photo ID card for second shot (‘T’ = tall posture). Reposition the student and take the second photograph. Write the number of the second shot on the recording sheet. Take the markers off the student, remove the coloured dot on the card that corresponds to the posture station and thank the student.

If you suspect that the shot did not work (i.e. someone walked in front of the camera, the student changed position or the flash did not fire), you will need to take another shot. Reposition the student and take another shot, making sure that you note the new shot number on the recording sheet with the ID number.



Posture recording sheet

Office use

Date	
Film No.	
ID	
Shot numbers	1 2 3 4 5 6 7 8 9 10 11 12
Any rpt	
Latin Square Pattern No.	